

ADJUSTABLE SEAT BACK FOR A WHEELCHAIR

Cross-Reference to Related Applications

Not Applicable

Statement Regarding Federally Sponsored Research or Development

Not Applicable

Background of the Invention

1. Field of the Invention

[0001] The present invention relates to wheelchairs, and more particularly to the back for the seat of the wheelchair.

2. Description of the Related Art

[0002] Wheelchairs are commonly used by people who are unable to walk. The typical wheelchair has tubular metal frame with large rear wheels at each side and smaller front wheels which typically swivel. In its simplest form, the seat of the wheelchair comprises a sheet of material which is hung between two horizontal arms of the frame and a similar vertical sheet of material strung between two vertical posts at the rear of the wheelchair. Such sheets of material are flexible thereby conforming to the contour of the user's body.

[0003] This simple seat arrangement can aggravate certain medical conditions of some wheelchair users, especially those with spinal abnormalities or injuries. As a

consequence, padded seat backs, such as the one in U.S. Patent No. 5,149,173, have been developed. This type of seat back has a slightly curved rigid back panel attached to the wheelchair frame and a foam cushion is mounted to the panel. The foam cushion forms a curved recess for receiving the back of the person seated in the wheelchair. The curvature of the seat back was relatively shallow in order to accommodate users having torsos of different sizes. The cushion can not be adjusted to conform to the contour of different sized torsos.

[0004] For wheelchair users requiring more lateral support, small bolsters can be attached on each side of the seat back. The attachment mechanism for such bolsters provides some degree of adjustability, both vertically and horizontally, with respect to the seat back cushion.

[0005] Nevertheless, there still exists a need for a more deeply contoured seat back which would provide greater lateral support for the torso of the wheelchair user. However, such a seat back would require a significant degree of adjustability in order to accommodate user torsos of various sizes and contours.

Summary of the Invention

[0006] A seat back for a wheelchair has a rigid, curved shell with a back panel from which two wings extend toward the front of the wheelchair. The first wing is fastened in an adjustable position at one side of the back panel and the second wing fastened in an adjustable position at the other side of back panel. In a preferred embodiment, the back panel comprises a central portion with a first lateral portion extending at a forward angle from one side, and with a second lateral portion extending at a forward angle from

another side. The first wing is adjustably fastened to the first lateral portion, and the second wing is adjustably fastened to the second lateral portion.

[0007] A cushion is attached to the shell and has a body of a resilient material, such as a closed cell foam for example. The body comprises a central section adjacent the central portion of the shell, a first lateral section adjacent the first wing, and a second lateral section adjacent the second wing. Preferably, the body has pleated sections which overlap the lateral portions of the shell. The pleated sections allow the width of the cushion to stretch and contract, thereby accommodating variation in the curvature of the shell due to adjustment of the wing positions.

[0008] A fastener arrangement is provided to attach the rigid shell to the wheelchair frame.

Brief Description of the Drawings

[0009] FIGURE 1 is an isometric front view of a wheelchair with a seat back according to the present invention;

[0010] FIGURE 2 is a isometric front view of a shell in the seat back;

[0011] FIGURE 3 is a rear exploded, isometric view of the shell showing fasteners for securing to the wheelchair frame;

[0012] FIGURE 4 is a front view of a cushion body that is incorporated in the seat back; and

[0013] FIGURE 5 is a top view of the cushion body.

Detailed Description of the Invention

[0014] With initial reference to Figure 1, a wheelchair 10 has a tubular metal frame 12 that includes a pair of vertical posts 14 and 16 and two horizontal members 19. A seat 15 of the wheelchair comprises a seat bottom 18 and a seat back 20. The seat bottom is formed by a sheet of fabric hung between the horizontal frame members 19.

[0015] The seat back 20 includes a back portion 26 from which two lateral supports 28 extend on each side toward the front of the wheelchair 10. The back portion 26 and lateral supports 28 form a curved, U-shaped structure within which the wheelchair user can rest and be supported to the rear and both sides. The seat back 20 is fabricated with a rigid, curved plastic shell 22 to which a cushion 24 is attached on the front. The rear of the plastic shell 22 is fastened to the vertical posts 14 and 16 of the frame 12, as will be described.

[0016] Referring to Figure 2, the shell 22 comprises several pieces 30, 38, and 42 of a rigid plastic, for example, adjustably fastened together by hex socket screws or bolts. Although the shell pieces and their sections are essentially planar, they are angled with respect to one another thereby forming a generally curved shell 22. Specifically, the shell has a single-piece, back panel 30 formed by a generally planar central portion 32 from one side of which a first lateral portion 34 extends at a forward angle. A second lateral portion 36 projects in a similar manner from the opposite side of the back panel 30. A first wing 38 of the shell 22 is attached to the first lateral portion 34 and a second wing 42 is secured to the second lateral portion 36. The first and second wings 38 and 42 each have a pair of elongated apertures 44 through which hex socket screws or bolts 40 extend from the back of the respective lateral portion 38 or 42 and are threaded into a

mounting bracket 46 to secure the shell pieces together. The elongated apertures 44 allow the position of each wing 38 and 42 to be adjusted in the horizontal direction. In addition, the first and second lateral portions 34 and 36 have a vertical row of apertures 48 (see Figure 3) through which the hex socket screws or bolts 40 can selectively extend to adjust the vertical position of each wing 38 and 42. Such horizontal and vertical adjustment allows the curvature of the shell 22, and thus the seat back 20 in general, to conform to the torso of different sized wheelchair users.

[0017] With continuing reference to Figure 3, four fasteners 50 are attached to the rear surface of the central portion 32 to secure the seat back 20 to the frame 12 of the wheelchair 10. Two of those brackets 50 are on each side of the central portion 32 and engage one of the vertical posts 14 and 16 of the wheelchair frame. Each fastener 50 includes an L-shaped bracket 52 that has a long leg 54 with two horizontal slots 56 there through. A pair of hex socket screws or bolts 58 pass through the slots 56 and through two of a plurality of apertures 60 which are aligned in two vertical rows in the shell central portion 32, as seen in Figure 2. Initially each aperture 60 extends only partially through the central portion 32 from the interior surface which provides a more aesthetically pleasing appearance to the seat back than if all the aperture opened through the rear surface that is exposed to view. When the mounting location for a fastener 50 has been selected, a tool, such as the Allen wrench, is inserted into the appropriate apertures 60 and used to punch the aperture through the rear surface of the central portion 32. The hex socket screws or bolts 58 engage threaded holes in a mounting plate 62 on the opposite side of the central portion to secure the L-shaped bracket 52 in place.

[0018] A short leg 64 of the L-shaped bracket 52 also has a pair of horizontal slots 66. A mounting hook 68 is attached to the short leg 64 by another pair of hex socket screws or bolts 72 that pass through the slots 66 and are threaded into apertures in a plate 74. The mounting hook 68 has a curved portion 70 which snaps around the respective vertical post 14 or 16 on one side of the wheelchair frame 12.

[0019] The two sets of elongated apertures 56 and 66 enable each fastener 50 to be adjusted along two orthogonal axes. Specifically, the brackets allow the seat back 20 to be moved in both horizontal axes, i.e. left to right and front and back. This adjustability allows the seat back 20 to be mounted on wheelchairs of varying sizes and to be positioned on the wheelchair frame 12 to accommodate the torso of the wheelchair user.

[0020] An strap 76 may be attached by hex socket screws 77 and a mounting plate 78 through apertures 79 in the upper region of the central portion 32. This provides a place for a hand to grasp the seat back 20 and the wheel chair 10 in general.

[0021] The cushion 24 of the seat back 20 shown in Figure 1 has a foam body inside and an outer cover 81. As shown in detail in Figure 4, the body 80 is fabricated from any one of several well known resilient foam materials, such as a closed cell foam, commonly used in seat cushions. The body 80 is formed initially from a flat piece of that material which is cut into the shape illustrated, so that when bent, the body conforms to the interior curvature of the shell 22. The body 80 has a central section 82 from which first and second lateral sections 84 and 86 project on opposite sides. The front surface 85 of the central section 82 has a grid of horizontal and vertical channels 88 through which air

flows between the body 80 and the cover 81 of the cushion. The horizontal channels 88 continue to extend laterally across the first and second lateral sections 84 and 86.

[0022] The first and second lateral sections 84 and 86 relatively deep V-shaped grooves 90 extending vertically in their front surfaces and a plurality of similar vertical grooves 92 in their rear surfaces interleaved with the grooves 90 in the front surface. The pattern these vertical grooves 90 and 92 in the lateral sections 94 and 96 form pleated regions 94 and 96 on each side of the body 80.

[0023] The body 80 is encased in the cover 81 made of a bidirectionally stretchable fabric to form the completed cushion 24, shown in Figure 1. The rear surface of the cushion cover 81 is formed of a hook material of a standard hook and loop fastening system, such as the type sold under the registered trademark VELCRO. A plurality of patches 98 of the loop component of the fastening system are adhered to the front surfaces of the elements 32, 38, and 42 of the shell 22, as shown in Figure 2.

[0024] In order to place the cushion 24 into the shell 22, the cushion is folded so that the first and second lateral sections 84 and 86 of the body 80 are folded over the front surface of the central section 82. The folded cushion is then placed into the shell so that the central section abuts the central portion 32 of the shell. Once the cushion 24 is pressed against the central portion 32, the hook and loop material on the abutting surfaces engage to hold the cushion in place. The first and second lateral sections 84 and 86 of the cushion body then are unfolded so that their outer edges align with the outer edges of the two wings 38 and 42 of the shell 22. This alignment is facilitated by the pleated portions 94 and 96 of the body 80 which allow the cushion to bend in conformity with the

curvature of the shell 22, and the width of the cushion 24 compress or expand. The compressibility and expansibility enable the cushion to accommodate the variable lengths of shell curvature due to adjustment of the wing positions. For example, in the illustrated configuration of the shell 22 shown in Figure 2, the wings 38 and 42 are located at the extreme inward position of adjustment, thereby creating the smallest curvature length from the front edge of first wing 38 to the front edge of the second wing 42.

Alternatively, when the two wings 38 and 42 are located at the extreme outward position, the length of shell curvature is several inches greater. This difference in the distance of curvature, depending upon the adjusted position of the wings 38 and 42, is accommodated by the expansion and contraction of the cushion 24 that is permitted by the pleated portions 94 and 96 of the body 80.

[0025] The foregoing description was primarily directed to a preferred embodiment of the invention. Although some attention was given to various alternatives within the scope of the invention, it is anticipated that one skilled in the art will likely realize additional alternatives that are now apparent from disclosure of embodiments of the invention. Accordingly, the scope of the invention should be determined from the following claims and not limited by the above disclosure.